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Do Role-Playing Simulations Generate Measurable and Meaningful Outcomes? A Simulation's Effect on Exam Scores and Teaching Evaluations

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DO ROLE-PLAYING SIMULATIONS GENERATE MEASURABLE AND MEANINGFUL OUTCOMES?

A SIMULATION'S EFFECT ON EXAM SCORES AND TEACHING EVALUATIONS

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ABSTRACT

Role-playing simulations are frequently claimed to be effective pedagogical tools in the teaching of international relations; however, there is a surprising lack of empirical evidence on their classroom utility. The assessment of simulations remains mostly anecdotal, and some recent research has found little to no statistically significant improvements in quantitative measures of academic performance among students who participated in them (e.g,, Krain and Lantis 2006; Powner and Allendoerfer 2008). Scant research has been conducted on how role-playing simulations might affect students' perceptions of the instructor's teaching. This paper investigates whether a simulation had statistically significant effect on students' exam scores in an international relations course or on student teaching evaluation scores.

KEYWORDS

international relations, simulation, teaching evaluation

INTRODUCTION

Role-playing simulations are often described as positive learning experiences for students. By their very nature, simulations allow students to participate more actively in the learning process and gain a more thorough understanding of course material. A better grasp of course content would seem to result in better academic performance and more favorable impressions of the instructor's teaching by students. In the Fall 2006, Spring 2007, and Fall 2007 semesters, I taught seven sections of the same introductory international relations course at a private university with an undergraduate enrollment of less than 5,000 students. Four of these sections participated in a role-playing simulation on the Middle East. During the same three semesters, three other sections of the course did not participate in the simulation. In contrast to what is commonly expected from the use of simulations, I noticed that there seemed to be no difference in academic performance between students who participated in the simulation and those who did not. The simulation also appeared to be associated with lower teaching evaluation results. I decided to investigate what statistically significant relationships, if any, might have existed between students' involvement in the simulation, their performance on exams, and their evaluation of my teaching.[1]

SIMULATIONS AND LEARNING

Role-playing simulations are frequently claimed to be a more effective instructional tool than traditional forms of teaching because they are thought to function as active, experiential learning exercises. With traditional pedagogical techniques, students must first passively receive

information from texts or lectures before they have the opportunity to apply the information to actual situations. Due to the delay between students' first encounters with new knowledge and its application, the relevance of and incentives for learning may not be apparent during much of the learning process (Dorn 1989:6).

In contrast, students who participate in simulations are thought to "experience institutional processes in ways that reading textbooks and listening to lectures may not allow" (Shellman 2001:827), producing a "deeper level of insight into the political process" (Smith and Boyer 1996:690) that demonstrates how the real world diverges from theoretical principles (Rodgers 1996:222). Role-playing simulations supposedly immerse students in a concrete situation that requires their active participation, allowing them to immediately apply new knowledge and observe the consequences of their actions – a process that facilitates the formation of abstract generalizations that students can test both against their experience in the simulation and against new circumstances inside and outside the classroom. This active, experiential mode of learning, outlined by Kolb (1984) in his interpretation of social psychologist Kurt Lewin's model of action research and laboratory training, is believed to be better than passive learning at creating effective thinkers (Dorn 1989:6; Brock and Cameron 1999:254; Shellman 2001:827; Freitas 2006:349).

Retention of information, the acquisition of problem-solving skills, and the understanding of abstract concepts are thought to be better with simulations than with traditional lectures and note-taking (Pace et al. 1990:63; Smith and Boyer 1996:690), and simulations are also believed to generate greater student motivation and effort despite the often large amount of work involved (Hensley 1993:67; Freitas 2006:348). Because of higher levels of motivation and effort, students supposedly attribute greater academic benefit to simulations than to passive pedagogical

methods, which in turn may produce a beneficial effect on student evaluations of the course and the instructor (Rodgers 1996:221; Dorn 1989:6). Greater effort, interest, retention, and understanding among students should also generate better academic performance in the course.

Simulation exercises that incorporate role- and game-play also would seem to be particularly useful for teaching international relations

> because they contain elements of conflict and cooperation, concepts that are fundamental to realist and liberal international relations theory. Conflict in a game occurs as players struggle to achieve the goals of a game. Cooperation is present because players must agree to the rules of the game in order to play. In some games, players also cooperate, if only temporarily, to achieve a common goal (Salen and Zimmerman, 2004:265).

Given the use of role-playing simulations and other active learning exercises over a period of decades, there is a surprising lack of empirical evidence on their classroom utility. Studies frequently claim that particular active learning strategies are superior to traditional instructional approaches but lack supporting quantitative or qualitative data. Simulations of all types "are rarely properly validated to determine whether/when they achieve their desired purposes or alternatively lead to dangerous or counterproductive outcomes" (Mandel 1987:339), and claims of their pedagogical effectiveness often consist, at least in part, of the subjective impressions of the instructor or the students (cf Shellman 2001:833; Powner and Allendoerfer 2008:7). For example, Smith and Boyer (1996:693-4) state that

> [t]he greatest unknown in using simulations is the impact of the method on student learning. Both of the authors of this article have accumulated large amounts of anecdotal evidence supporting the idea that simulation promotes

> greater depth of understanding and higher levels of retention while promoting the development of stronger critical thinking and analytical skills and generating enthusiasm for learning. Unfortunately, none of this information has been collective, standardized, or quantified. Indeed, many of our colleagues still believe we receive large teaching enrollments and solid teaching evaluations because the students enjoy playing games rather than sitting through the more traditional, lecture style course. But we conclude otherwise.

While many scholars argue that active learning techniques are more effective in teaching "content, critical thinking, and problem-solving skills than conventional methods of lectures, reading, and group practice" (Dorn 1989:8), one study of the use a gaming exercise in an introductory economics course found that the exercise had

> little comparative advantage over common instructional techniques. While it does encourage students to become more actively involved in the learning process, the amount of gain in economic understanding that a student could expect relative to an alternative experience of a conventional introductory course is considerably less . . . When the impact of the game was compared to the impact of conventional teaching under controlled situations, there was no statistically significant difference in student attitudes . . . The benefits associated with the game's use were few if any (Wentworth and Lewis 1975:118).

In more recent research, Krain and Lantis (2006) found no statistically significant difference in quiz scores earned by students who participated in role-playing simulations on disarmament and torture and those of students who experienced the more traditional pedagogical techniques of classroom lecture and discussion. In a similar study that examined short term

factual recall and analytic comprehension, Powner and Allendoerfer (2008) found that students who participated in a brief role-play activity scored better on multiple choice questions after the activity than students who participated in classroom discussion, but that there was no statistically significant difference in the overall performance of the two groups.

STRUCTURE OF THE COURSE AND STUDENT CHARACTERISTICS

The international relations course used in this study is an introductory level requirement for both political science and interdisciplinary international studies majors and an elective for other students. The majority of students who enrolled in the course did so during their first year of college, before they declared a major field of study. Students were informed on the syllabus and in class that the primary learning objectives for the course were threefold:

- understand different international relations theories,
- use those theories to explain the behavior of international political actors,
- become familiar with the political environment in which decision-makers create and implement foreign policy.

Exams and writing assignments were designed to evaluate students' achievement of these objectives. Course content was consistent across all sections of the course taught by the instructor, and all students, whether they participated in the role-playing simulation or not, heard the same lectures by the instructor, took three exams containing similar or identical questions on the same topics, and were required to answer the same questions on the same reading assignments. All students were asked to write a five page essay that demonstrated how an

international relations theory could be used to explain an historical event such as the signing of the Strategic Arms Limitation Treaty or the Iraqi invasion of Kuwait.

STRUCTURE OF THE SIMULATION

The simulation was designed and managed solely by members of the university's Model United Nations (MUN) club. The instructor was present during the simulation for observational purposes only. All students who participated in the simulation were informed on the syllabus and in class that the simulation's learning objectives were the same as those for the course and that the assignments for the simulation reflected those objectives. Students participating in the simulation were divided into teams representing the governments of various Middle Eastern nation-states, such as Iran and Saudi Arabia, or international organizations and regional non-state actors, such as the Democratic Kurdish Alliance and Hezbollah. Each team was led by a chairperson from the MUN club, who functioned as the line of communication between his or her team and the simulation's command center operated by MUN club members. The other students on each team were randomly assigned the roles of specific team-level government officials or leaders – e.g., the Israeli Minister of Defense.

For each semester's simulation, MUN club members created a series of crisis scenarios to which each team would have to decide how to respond. Neither team chairpersons nor the other team members knew of these scenarios prior to the simulation. The crisis scenarios included events such as mortar fire from the Golan Heights into Israel, an oil spill in the Persian Gulf caused by a disabled oil tanker, and terrorist attacks against Saudi oil facilities.

Each simulation occurred over two successive days outside of regular class time – a Sunday afternoon and evening and a Monday evening – for total period of eight hours. Teams were located in separate rooms equipped with a computer console, internet access, and a large wall-screen. Communication from or to each team was primarily electronic and had to pass through the crisis command center so that its staff would be able to coordinate events.

Students appeared to quickly understand the simulation's structure and rules despite having never before participated in such an exercise. Most students quickly became engaged in the role-playing and real-time aspects of the simulation by discussing possible courses of action, seeking out information from the command center or from the internet via their chairpersons, and issuing communicating with the command center and other teams in a timely fashion. The simulation represented a large time commitment for students outside of class, but the vast majority of students attended the entire simulation, demonstrating at a fairly high degree of student interest in the exercise.

The quantity and quality of student participation in decision-making process often varied greatly within each team, however. Discussion and debate were sometimes dominated by three or four students on a team, with two or three students remaining silent. Students demonstrated differing levels of familiarity with the Middle East during the simulations, and some were ignorant of basic geographical, cultural, and historical knowledge about the region.

ASSIGNMENTS AND FEEDBACK

Students who participated in the simulation were required to complete assignments that students in other sections of the course did not. The weight of these assignments toward the final

grade for the course was the same across all sections that participated in the simulation.[2] Prior to the simulation, each participant was required to analyze the international interests and behavior of the nation-state or organization to which she or he had been assigned and write a synopsis of findings. Directions for the assignment specified that each student should write the analysis from the perspective of the particular role he or she was to play during the simulation; for example, a student assigned the role of minister of defense for Israel would need to concisely identify regional threats to Israel's security, its military capabilities, and its defense policy. Students presented their analyses to other students during class. The intent of the assignment was to increase students' knowledge of the foreign policies of the various actors in the simulation, and help them create a clear and realistic set of goals that they could focus on achieving as the simulation unfolded. Secondly, each simulation participant was required to write a five page essay that identified how well a single international relations theory explained the events that occurred during the simulation. Finally, all students who participated in the simulation were required to assess their experience by providing the instructor with written answers to questions such as:

- What did you learn about the nature of international politics that you may not have considered before?
- What did you learn about your own ability to interact with others on important international issues in a simulated context?
- What did you learn about your own preparation for the simulation and the importance of prior knowledge for this type of experience?
- How would you assess your involvement in the actual simulation, whether by speaking, writing, or other means?

- What suggestions would you offer to make this simulation a better learning experience in the future?

Students' assessments of the simulation were remarkably uniform across sections and semesters. The majority of the instructor's students stated that they enjoyed participating in the simulation and believed that it was a good educational experience. Many students stated that they had learned more "by doing" than by listening to class lectures or reading a textbook. Students felt that the simulation demonstrated how abstract ideas that had been discussed in class – alliance building, negotiation, deceit, the security dilemma, power, and deterrence – describe fluid "real-world" situations. Students wrote that applying these concepts to a concrete experience enabled them to gain a greater understanding of the substance of international relations. Comments on the assessment were often phrased in terms that reflected the international relations theories that students had been studying during the semester; for example, "one minute alliances matter deeply, another minute countries are attacking their friends" and "all states acted in order to achieve their self-interests and often obtained greater security by blindsiding or otherwise causing other nation-states in the system to become weaker." Some students indicated that they were motivated to participate in the simulation because of the presence of their peers.

Some students also stated in their assessments that they felt unprepared and that they would have prepared differently, if not necessarily more, if they had the chance to participate in the simulation a second time. Students expressed frustration over knowing little about how the nation-states in the region interact with one another and frequently commented that prior study of the Middle East would have been beneficial. Despite these criticisms, an overwhelming majority

of students indicated in their assessments that they felt that the role-playing simulation was engaging and informative.

EXAM SCORES

In each semester, the simulation occurred between the second and third exams in the course. If the simulation helped students learn more effectively than traditional lectures and assignments, students who participated in the simulation should have scored higher on the third exam than the students who did not participate. Also, any improvement in scores between the second and third exams should have been greater among simulation participants than among students who did not participate.

In all class sections in this study, the second and third exams across contained the same or similar questions related to international relations theory. In one portion of the second and third exams, students were asked to match a phrase with the corresponding theory; for example, the correct answer for "sovereignty makes the state a unitary, autonomous actor" was "realism." In another portion of the exams, students were asked to write a short essay that answered a question such as "do liberal, realist, or radical international relations theories best explain the effects of international trade? Why?" All exams were graded on a 100 point scale. For the Fall 2006 semester, one class taught by the instructor participated in the simulation and two of the instructor's classes did not. Simulation participants scored an average of 8.6 points higher on the third exam than students who did not participate in the simulation. Simulation participants also had an average change in scores between the second and third exams that was 7.5 points greater than that of students who did not participate in the simulation (Figure 1).

Fall 2006				
	N	Mean Score Exam 2	Mean Score Exam 3	Difference
In Simulation	32	70.3	76.8	6.5
Not In Simulation	62	69.1	68.2	-1.0
Difference		1.2	8.6	7.5

Figure 1: Exam Scores for the Fall 2006 Semester

In the Spring 2007semester, the instructor taught only one international relations class of eleven students, and this class participated in the simulation. The mean scores for the second and third exams in class were 76.4 and 68.5, respectively.

For the Fall 2007 semester, two classes participated in the simulation and one class did not. Simulation participants scored an average of 4.5 points lower on the third exam than students who did not participate in the simulation. Simulation participants also had an average change in scores between the second and third exams that was 6.3 points smaller than that of students who did not participate in the simulation (Figure 2).

Fall 2007				
	N	Mean Score Exam 2	Mean Score Exam 3	Difference
In Simulation	47	82.1	80.7	-1.4
Not In Simulation	21	80.3	85.2	4.9
Difference		1.8	-4.5	-6.3

Figure 2: Exam Scores for the Fall 2007 Semester

When data for all three semesters are aggregated, simulation participants scored an average of 5.3 points higher on the third exam than students who did not participate in the

simulation, a difference that was statistically significant using a two-tailed t test ($p < 0.01$). However, they also scored an average of 5.2 points higher on the second exam than students who did not participate in the simulation, a difference that was also statistically significant using the same test ($p < 0.01$) (Figure 3). Since the simulation always occurred between the second and third exams, the simulation does not appear to be responsible for the higher exam scores earned by students who participated in it.

All Semesters				
	N	Mean Score Exam 2	Mean Score Exam 3	Difference
In Simulation	90	77.2	77.8	0.6
Not In Simulation	83	72.0	72.5	0.5
Difference		5.2	5.3	0.1

Figure 3: Aggregate Exam Scores for All Semesters

STUDENTS' EVALUATIONS OF THE INSTRUCTOR'S TEACHING

Each semester students were asked to complete anonymous evaluations of the instructor's teaching. A response of one to a statement on the evaluation indicated "strongly disagree" and a response of five indicated "strongly agree." The questions on the evaluation instrument were the same across semesters and classes and consisted of the following:

1. The instructor has clear student learning objectives for the course.
2. The instructor's class is well prepared and well organized.
3. The instructor communicates course material clearly.
4. The instructor displays interest in the subject.

5. The instructor summarizes or emphasizes important points in class.

6. The instructor stimulates my thinking about the subject.

7. The instructor provides opportunities for student contact outside of class.

8. The instructor expresses concern about student progress in the course.

9. The instructor provides useful feedback on exams and assignments.

10. The instructor clearly indicates how my work will be evaluated.

11. I have put a lot of effort into this course compared to other courses.

If the simulation helped students achieve the learning objectives of the course and students are able to accurately assess their achievement of these learning objectives, evaluations of the instructor's teaching should have been higher for students that participated in the simulation than those that did not participate. Yet in both the Fall 2006 and Fall 2007, mean scores for evaluation questions 3, 8, and 9 were lower for students that participated in the simulation, and the mean score for evaluation question 10 was lower for simulation participants in the Fall 2006 semester while only slightly higher for the Fall 2007 semester. For the Fall 2006 semester, the differences in the mean scores for evaluation questions 3, 8, 9 and 10 were statistically significant using a two-tailed t test ($p < 0.01$) (Figure 4).

	Means				
Evaluation Question	N	In Simulation	N	Not In Simulation	Difference
Communicates Clearly	30	2.07	61	2.66	-0.59
Expresses Concern	30	1.37	61	1.93	-0.56
Provides Feedback	30	1.33	61	2.03	-0.70
Indicates How Work Evaluated	28	1.54	61	2.33	-0.79

Figure 4: Mean Evaluation Scores for the Fall 2006 Semester

For the Fall 2007 semester, none of the differences in mean scores for the same evaluation questions were not statistically significant (Figure 5).

	Means				
Evaluation Question	N	In Simulation	N	Not In Simulation	Difference
Communicates Clearly	44	4.25	18	4.33	-0.08
Expresses Concern	43	3.16	18	3.72	-0.56
Provides Feedback	44	3.48	18	3.67	-0.19
Indicates How Work Evaluated	42	3.95	18	3.83	0.12

Figure 5: Mean Evaluation Scores for the Fall 2007 Semester

INTERPRETING THE RESULTS

Because the simulation was not associated with statistically significant improvements in exam scores, it appears that the simulation did not help students meet the learning objectives of the course. Other explanations for the lack of improvement in exam scores are possible. First, the simulation may have helped students acquire knowledge related to the objectives of the course, but this knowledge may not have been elucidated by some or all of the questions on the exams. However, students' assessments of the simulation are consistent with those reported by other studies – students believed that the simulation helped them gain knowledge related to stated learning objectives. Second, the simulation may have helped students acquire new knowledge, but the knowledge obtained through the simulation was unrelated to the objectives of the course and thus remained hidden from the instructor. If the simulation did not help students obtain knowledge related to the predetermined objectives of the course, the simulation did not serve the function intended by the instructor.

Characteristics unique to the students or the sections under study may also explain the lack improvement in exam scores. As stated above, the majority of students in the sections under study were in their first or second semester of college. Unfamiliarity with the college environment, stress, or other factors may have affected the performance of freshmen on exams more than for sophomores, juniors, and seniors. The time of day that classes met could have also affected student exam scores. Students in an early afternoon class could have been suffering from hunger or post-prandial stupor or students in an early morning class could have been suffering from sleep deprivation; however, no significant differences were seen in students' exam scores when compared against the time of day that classes met. The general academic

ability of students in the sections studied may have also been a confounding variable, but no information on students' high school or college GPA was available for analysis.

A larger sample would have been useful in more clearly identifying whether the simulation contributed to students' learning; however, the instructor of the sections analyzed in this study no longer teaches the course, and data is not available from other instructors whose students participated in the simulation in other semesters. Administering a standardized exam at the end of the course and in a subsequent semester may have demonstrated that students who participated in the simulation had greater retention of course content, but this type of inquiry was not part of the university's curriculum.

The simulation was associated with lower teaching evaluation results, a finding that is difficult to explain given students' extremely positive reaction to the simulation. It is possible that the active learning environment of the simulation – an environment in which students rather than the instructor were responsible for making decisions – caused students to believe that the instructor was unconcerned with their progress in the course. Students may have expected to be told what and how to learn by the instructor, and they rated the instructor accordingly when they found themselves forced to think independently while working collaboratively with their peers. Similarly, students may have thought that the time spent engaged in peer to peer interaction during the simulation somehow reduced the clarity of directions and the amount of feedback that they received from the instructor on assignments and exams.

However, students were required to prepare for the simulation with writing assignments and classroom presentations, and their writing assignments were graded with the same rubric used by the instructor in the sections that did not participate in the simulation. Learning objectives were presented to the students and aspects of the simulation were discussed by the

instructor before the simulation began, and students were debriefed in class after the simulation had been completed. While students' scores on question 11 on the evaluation instrument – "I have put a lot of effort into this course compared to other courses" – were on average higher in the classes that participated in the simulation than in those that didn't, students still reported that they believed that it was a worthwhile educational experience.

Overall, the simulation consumed substantial amounts of time and effort for both students and the instructor inside and outside of class, but it was associated with only a tenth of a point increase in students' scores on the third exam – a negligible and probably statistically meaningless improvement in learning outcomes for students. Although students indicated that they thought the simulation was a useful educational experience in relation to the learning objectives of the course, the simulation was associated with lower student evaluations of the instructor's teaching. Given these results, it is questionable whether this simulation was a useful pedagogical exercise.

NOTES

1. Data was analyzed after students' final grades had been submitted. Identifying information was removed from the data set to protect student anonymity.

2. For example, in the Fall 2007 semester, the final grade for students who did not participate in the simulation was calculated as follows:

Case study annotated bibliography	5 percent
Case study outline	5 percent
Case study essay	10 percent
Analytical reading presentations	5 percent
Participation in class discussion	5 percent
Reading assignment responses	25 percent
Three exams	45 percent

The final grade for students who participated in the simulation in the Fall 2007 semester was calculated as follows:

Case study annotated bibliography	5 percent
Case study outline	5 percent
Case study essay	10 percent
Analytical reading presentations	5 percent
Participation in class discussion	5 percent
Reading assignment responses	20 percent
Three exams	30 percent
Crisis simulation background paper	5 percent
Crisis simulation assessment	5 percent
Crisis simulation essay	10 percent

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